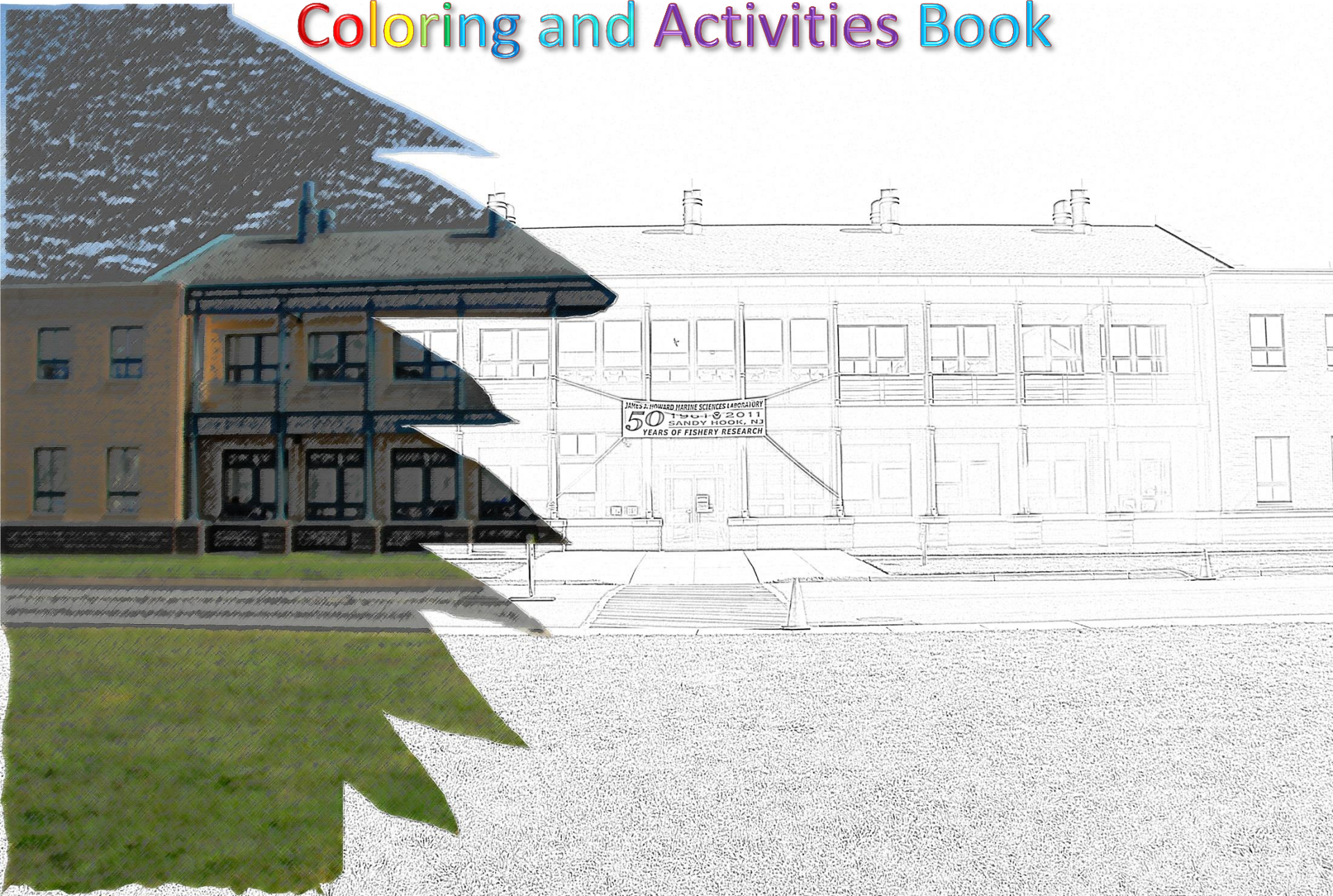


The James J. Howard Marine Sciences Laboratory

Coloring and Activities Book



For more than 50 years, the James J. Howard Laboratory at Sandy Hook has collected information on commercially and recreationally important species of fish and shellfish, their habitat requirements, and the effects of human activities such as ocean dumping, dredging, and marine contaminants upon the communities in which they live. We hope that you enjoy our coloring and activity book and learn more about our activities at the laboratory and the unique and wondrous animals and the world in which they live.

We gratefully acknowledge all of the wonderful people who volunteered their time to put this together for you. We especially appreciate the contributions from our young illustrators, Jennifer, Ryleigh, and Delaney.

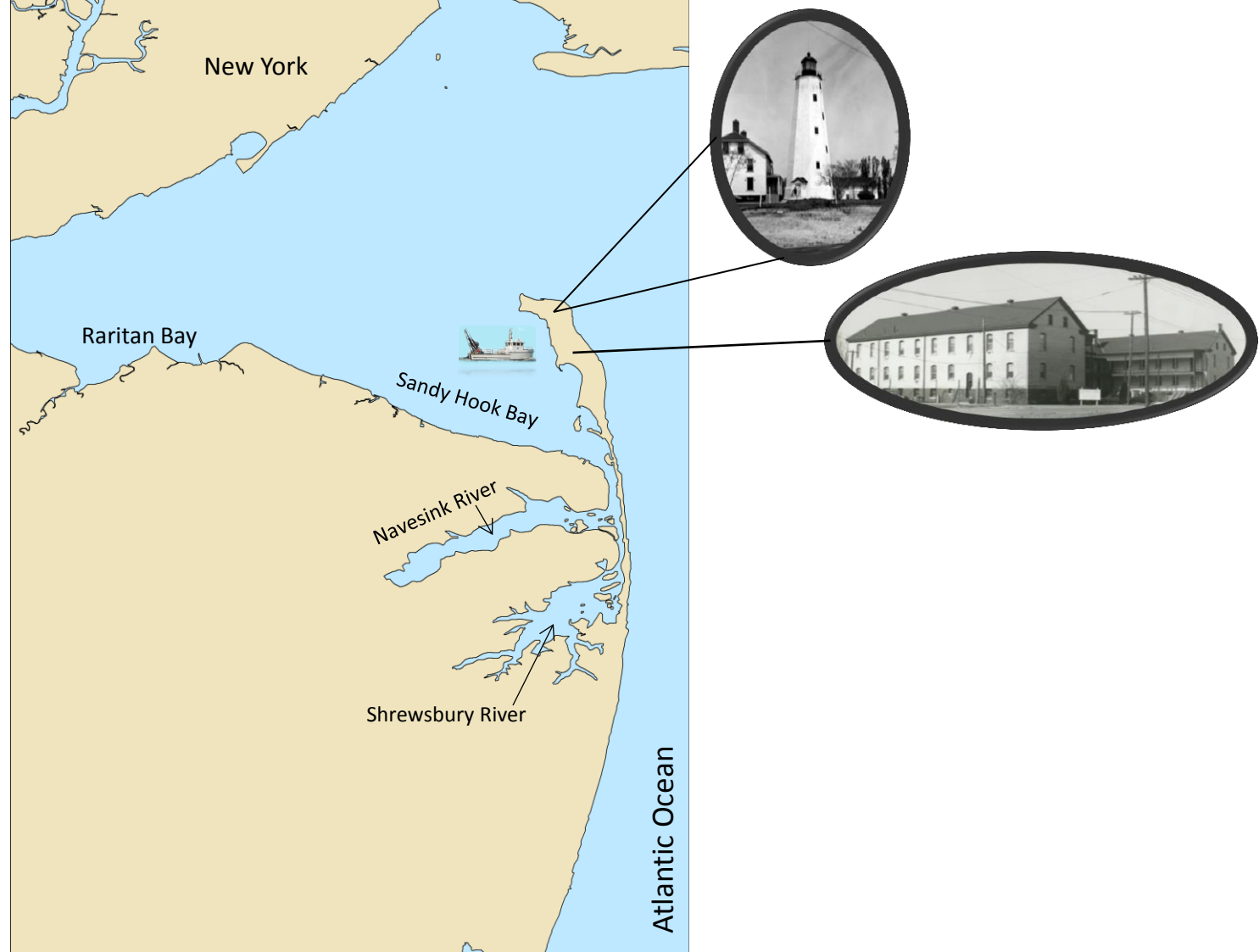
For more information about the Lab check out our website: <http://sh.nefsc.noaa.gov/>



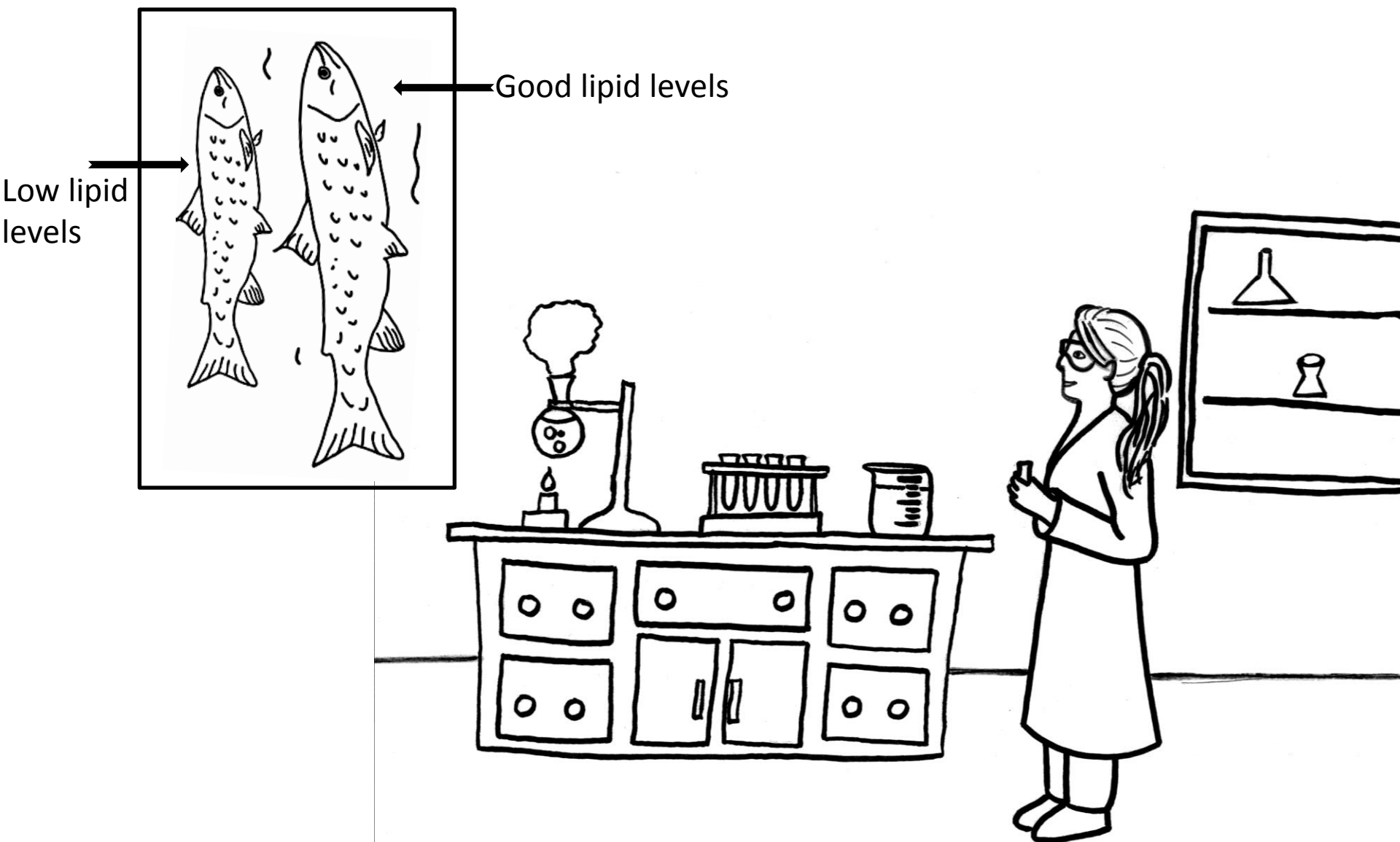
Guess what Grandpa? Tomorrow Mommy is going to take us to the James J. Howard Marine Sciences Lab at Sandy Hook. Could you tell us about it?

- I'd love to, Eric and Lindsey. At the Laboratory, you will meet some of my friends and learn about the fascinating research they conduct. The Laboratory staff consists of a diverse set of scientific and technical expertise, including ecologists, chemists, and fisheries biologists. Their job is to support marine research, management and educational needs for the state of NJ, the region, and the nation. You will learn many things, like...





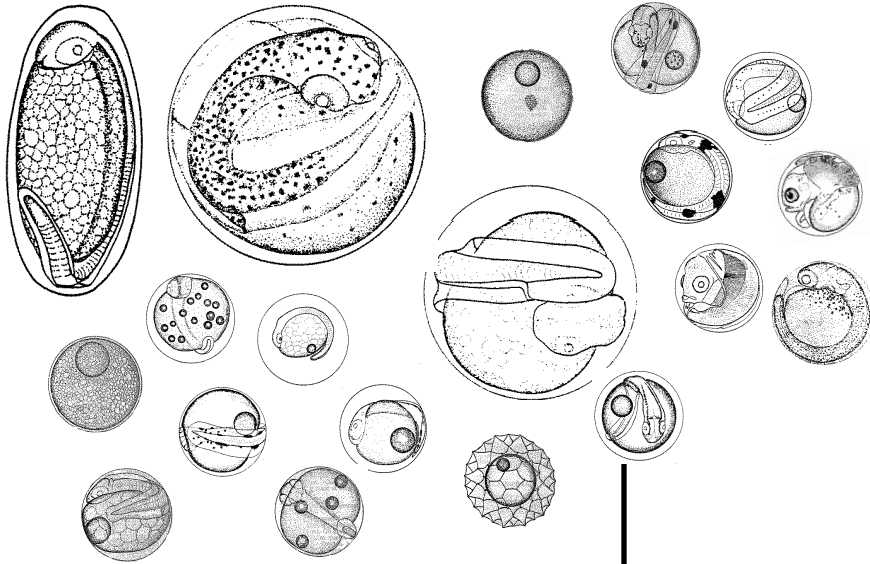
.....the James J. Howard Laboratory is centrally located to the New Jersey shore and to the urban and suburban areas of both New Jersey and New York. This location makes it a perfect place to study the interaction between the marine environment and human activities. Do you know where Sandy Hook is on this map? Can you circle it?



At the Lab, you'll meet my friend Beth. She is a Marine Chemist who studies lipid levels, which is the fat content that fish store in their bodies. Scientists use these levels as a way of estimating nutrition and growth rates of fish; such as juvenile Atlantic cod, summer flounder, Atlantic salmon and winter flounder. Low lipid levels affect growth rates. Fish with low lipid levels or low fat will have slower growth rates than fish with higher lipid levels.

Another friend is Matt; he studies harmful contaminant levels of PCB pesticides and the effects of contaminated habitats.

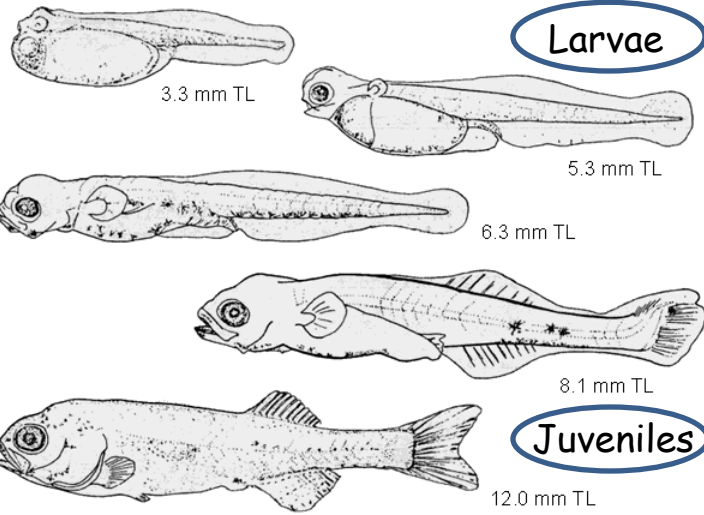




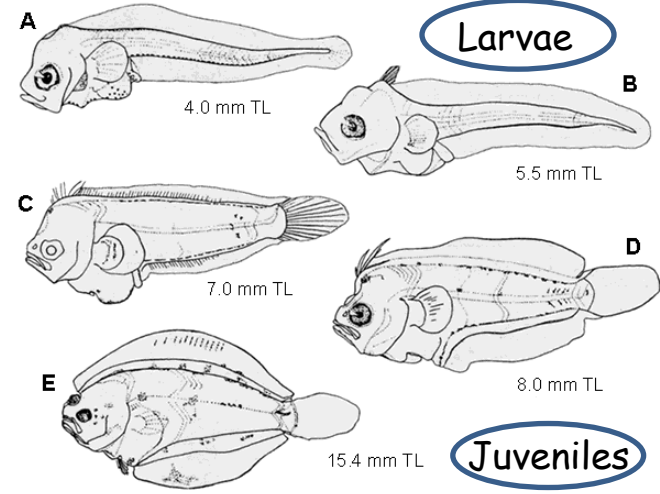
Fish Eggs

Larvae

Juveniles



Striped Bass Development



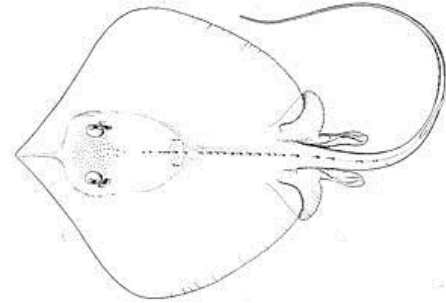
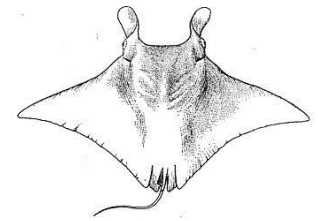
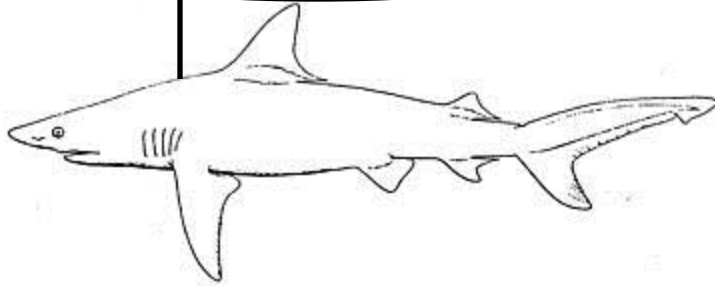
Summer Flounder Stages of Development

Laboratory scientists also study all stages of fish development from egg to adult.

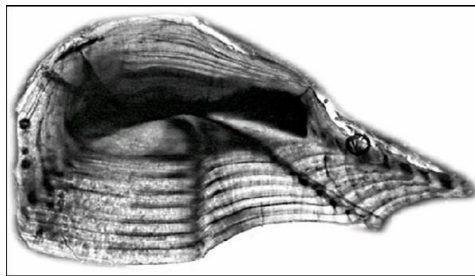
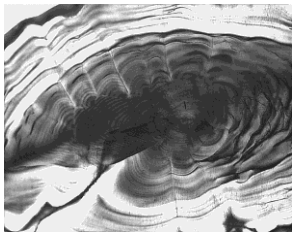
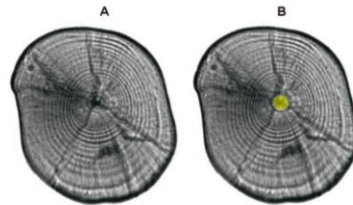
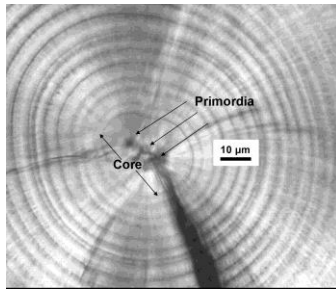
You'll see how scientists are looking at water temperature ranges and how it affects the early stages (eggs, larvae and juveniles) of growth and survival of fish.

Too much of a change in temperature or climate can be bad for fish development. It can also affect the food that they eat and the habitat where they live.

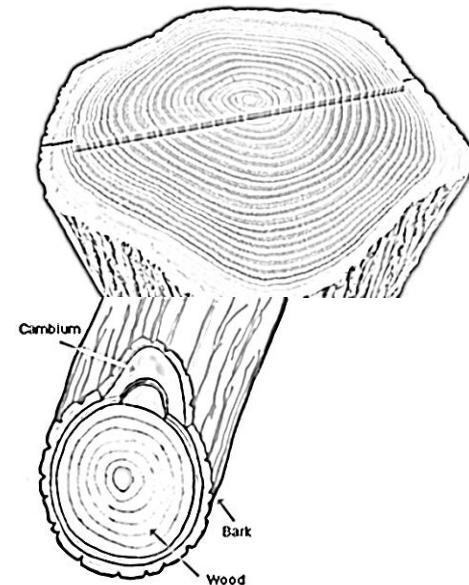
We don't have otoliths



Rings on Fish Otoliths



Tree rings



All fish possess otoliths, except sharks, rays, and lamprey. Otoliths are often referred to as the "ear bone." They are responsible for fish balance and hearing.

Three pairs of otoliths are found in each fish. With each day and each year a new set of rings is laid down on to the otolith and scientists can read otolith rings the way we count rings to age trees.



Another group of lab researchers is devoting their time to studying the effects of climate change and ocean acidification. A pH unit is a measure of acidity ranging from 0-14. The lower the value, the more acidic the environment.

When carbon dioxide (CO₂) is absorbed by seawater, chemical reactions occur that reduce seawater pH, carbonate ion concentration, and saturation of biologically important calcium carbonate minerals. These chemical reactions are termed "ocean acidification" or "OA" for short.



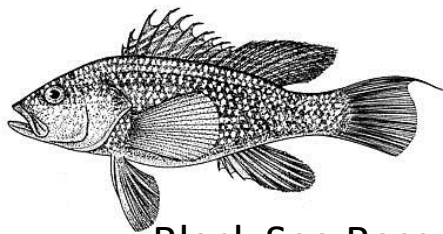
Ocean acidification is an emerging global problem. In the Lab, our scientists in collaboration with resource managers, and policymakers recognize the urgent need to strengthen the science as a basis for sound decision making and action.



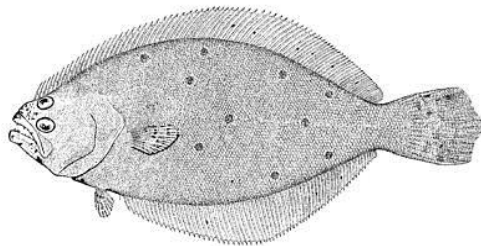
The researchers are doing experiments to see how the warming of our ocean affects how much food is available for fish to eat and grow.



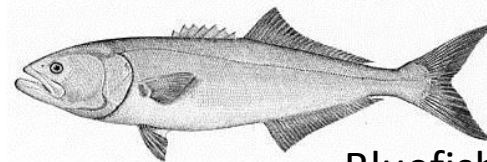
Some of the research staff have developed a one of a kind method to determine the effects of increased carbon dioxide on the growth of important fish species like flounder and black sea bass.



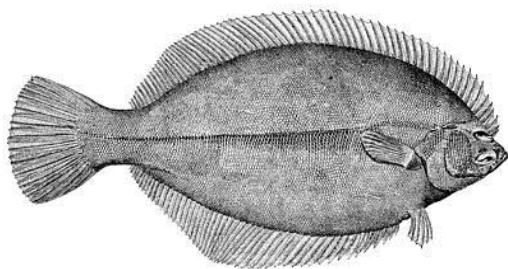
Black Sea Bass



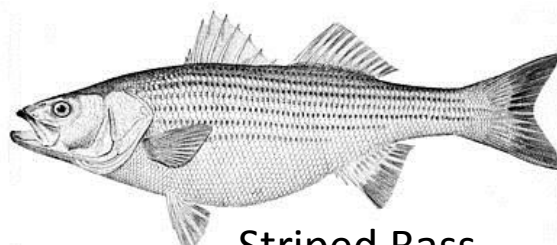
Summer flounder



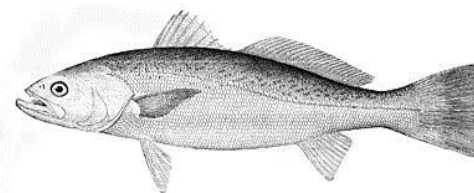
Bluefish



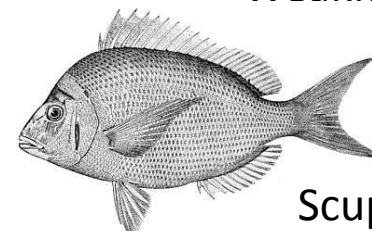
Winter flounder



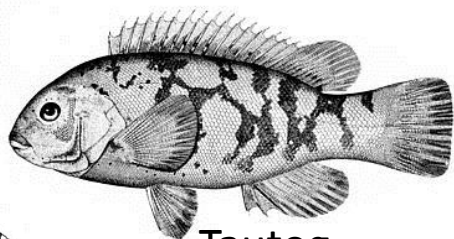
Striped Bass



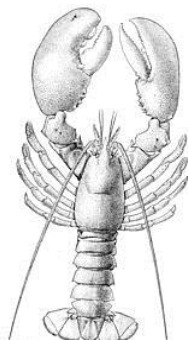
Weakfish



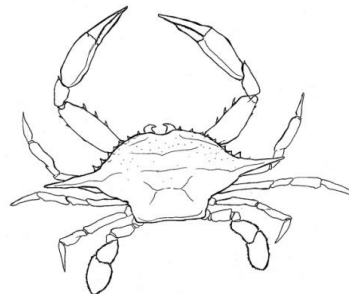
Scup



Tautog



lobster



Blue crab



Oyster



Mussel



Bay Scallop

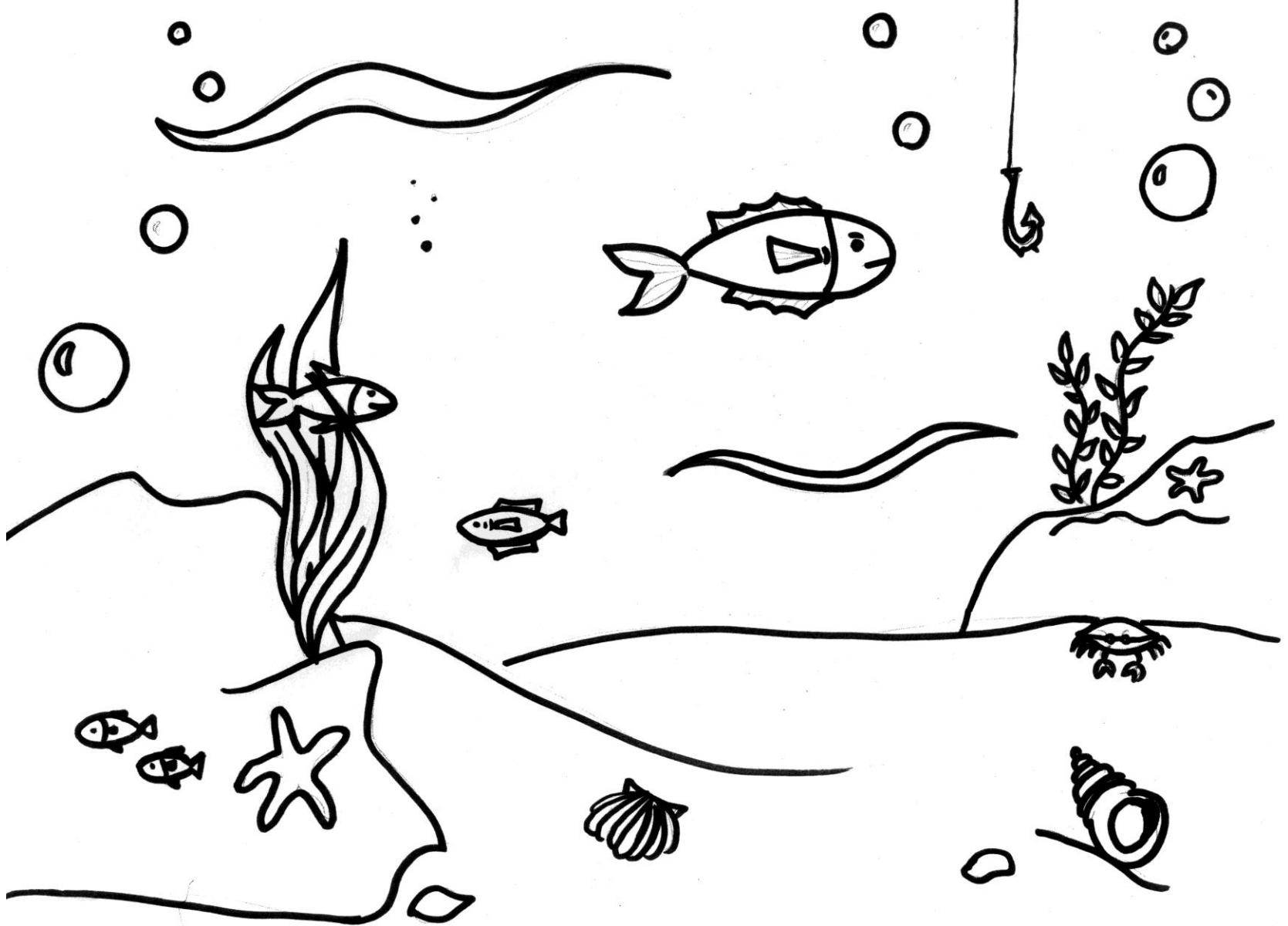


Clam

Laboratory staff have conducted research on a variety of recreational fish species found in NJ. They conduct surveys of recreational fish that can be found in our local bays, rivers, and coastal ocean habitats. Some of the species they study are shown here.



Some of our scientists go out to sea on large research vessels and use AUV's (autonomous underwater vehicles) that are put overboard to take samples, pictures and readings from the deep sea.



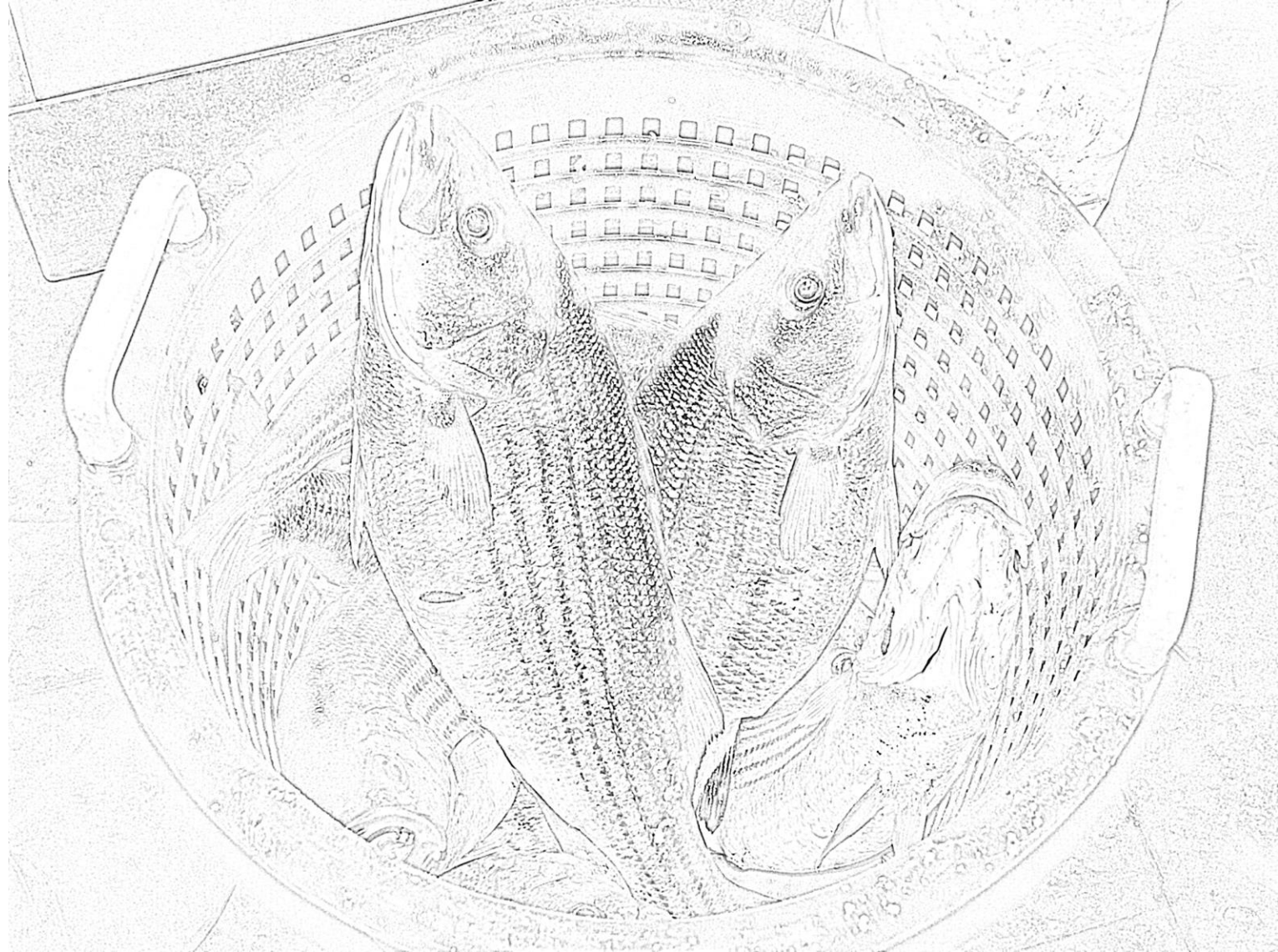
Color the world beneath the sea!



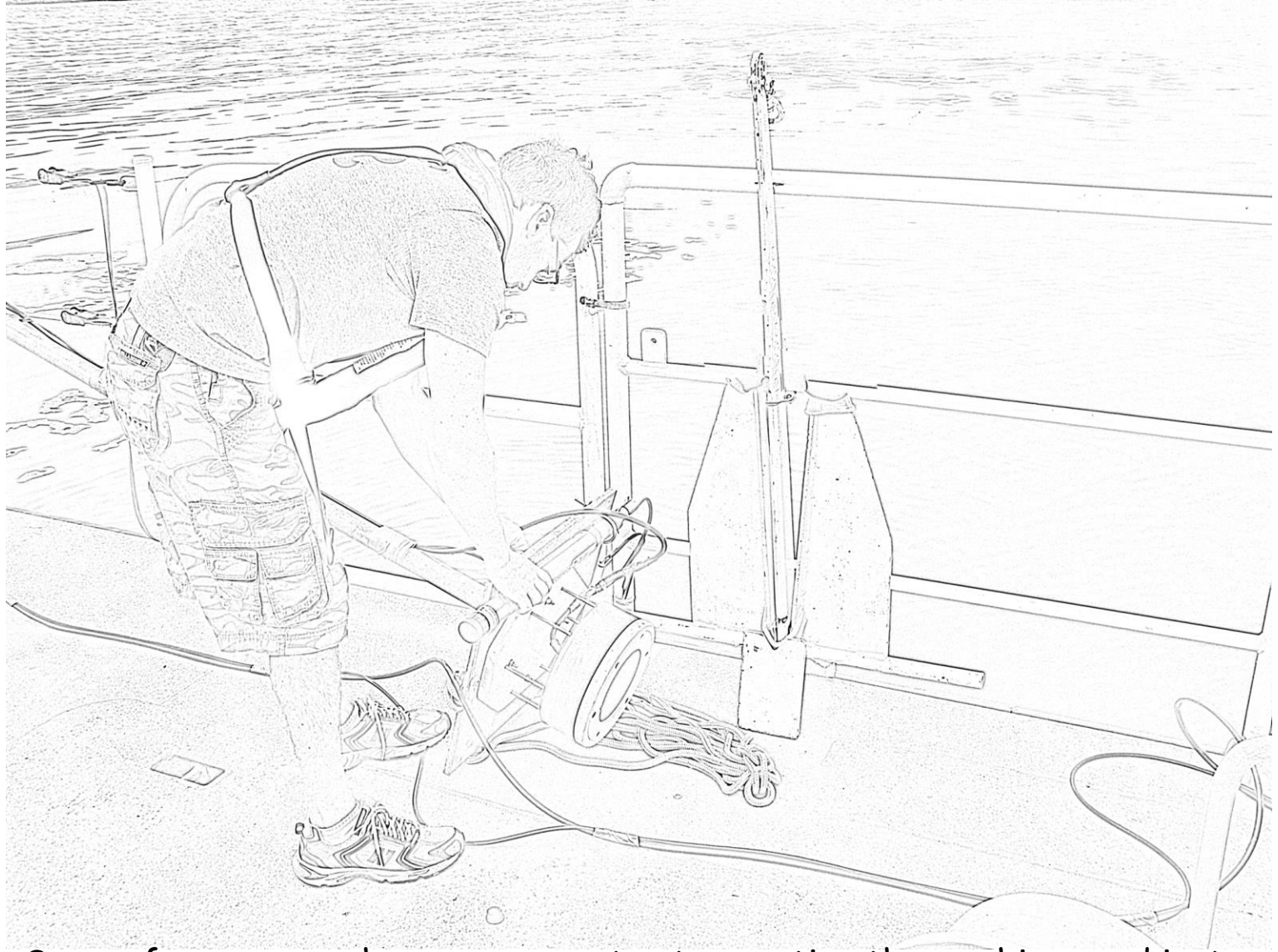
The staff has many diverse duties. Some days they work on large ships, while other days they work on small boats, and still other days they work in the laboratory building on Sandy Hook.



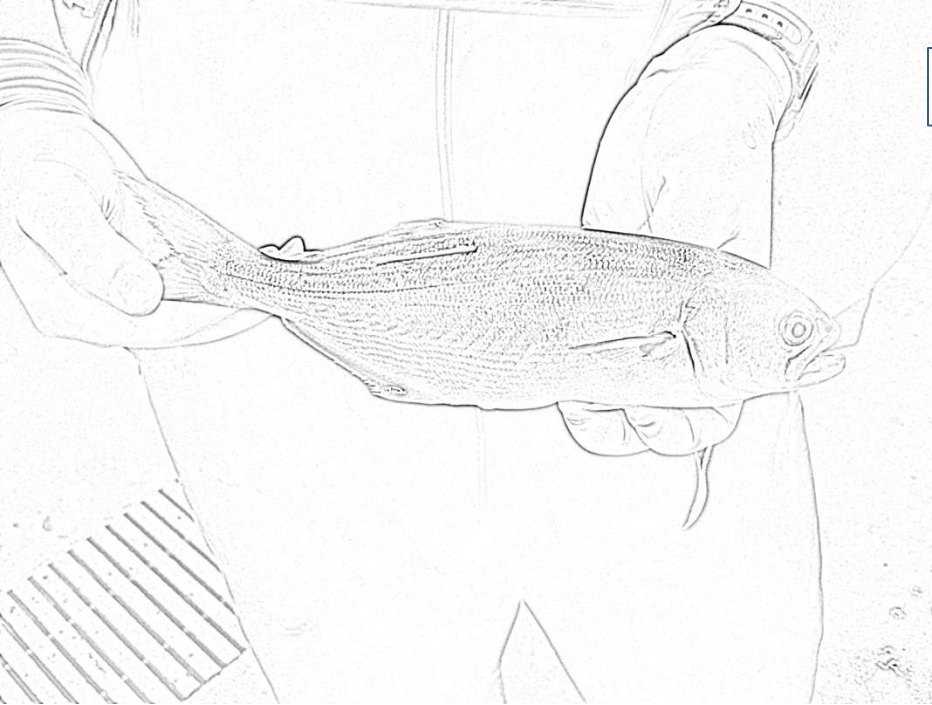
Their work is important to them. They enjoy working in a science field that allows them to protect all types of fish and to help keep the ocean environment clean for future generations.



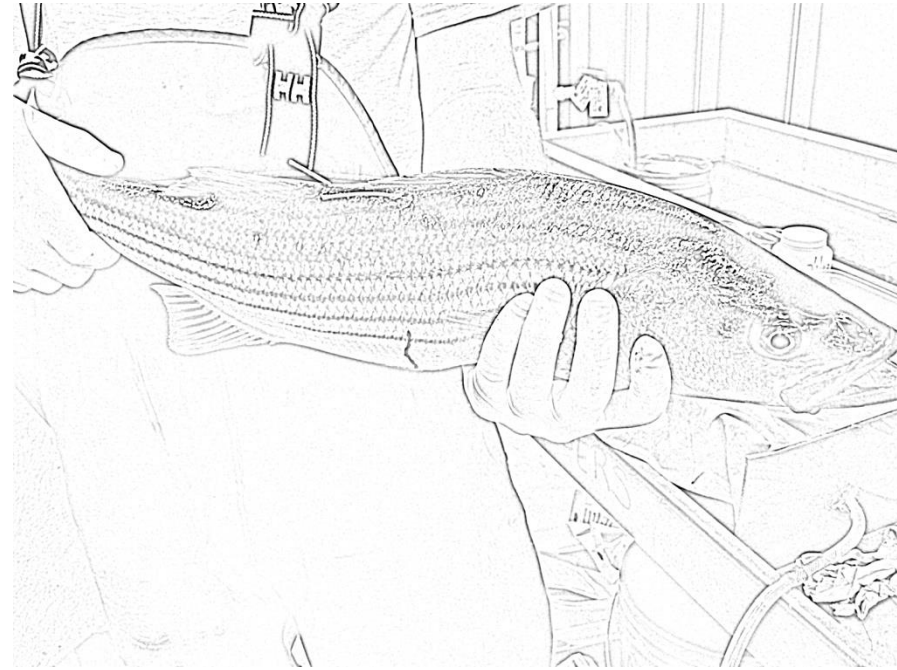
There are lots of neat things to see at the Lab. The James J. Howard Laboratory has a unique research aquarium with a 32,000 gallon research tank. Studies have been completed there on striped bass and bluefish schooling, temperature tolerance, swimming speed, endurance, and competition for prey.



Some of our researchers are experts at operating the machines and instruments that measure the conditions of the ocean. Some of the instruments measure the temperature of the water, how salty it is, how much oxygen is in the water and how clear the water is. Other instruments use sound to measure how fast the water is moving and whether there are fish underneath the boat. These measurements are very important to learning where fish like to live.



Bluefish with tag



Striper with tag

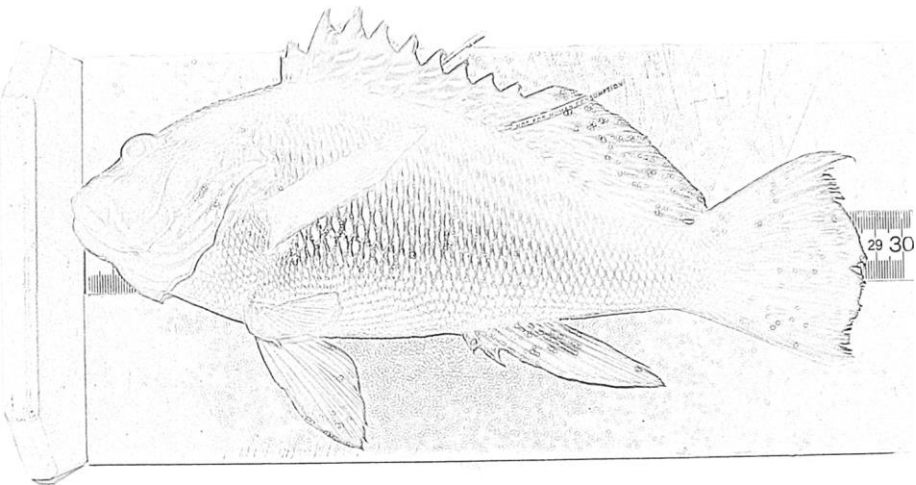
Some of our researchers attach electronic tags to a variety of local fish. The tags are like fish GPS systems and help the scientists understand where fish swim and live, how their behavior relates to their surroundings, what they eat, what happens to them if they are caught in a storm or a trawl, where they go when the water gets too cold or too hot, how fast they grow, and when and where they reproduce.

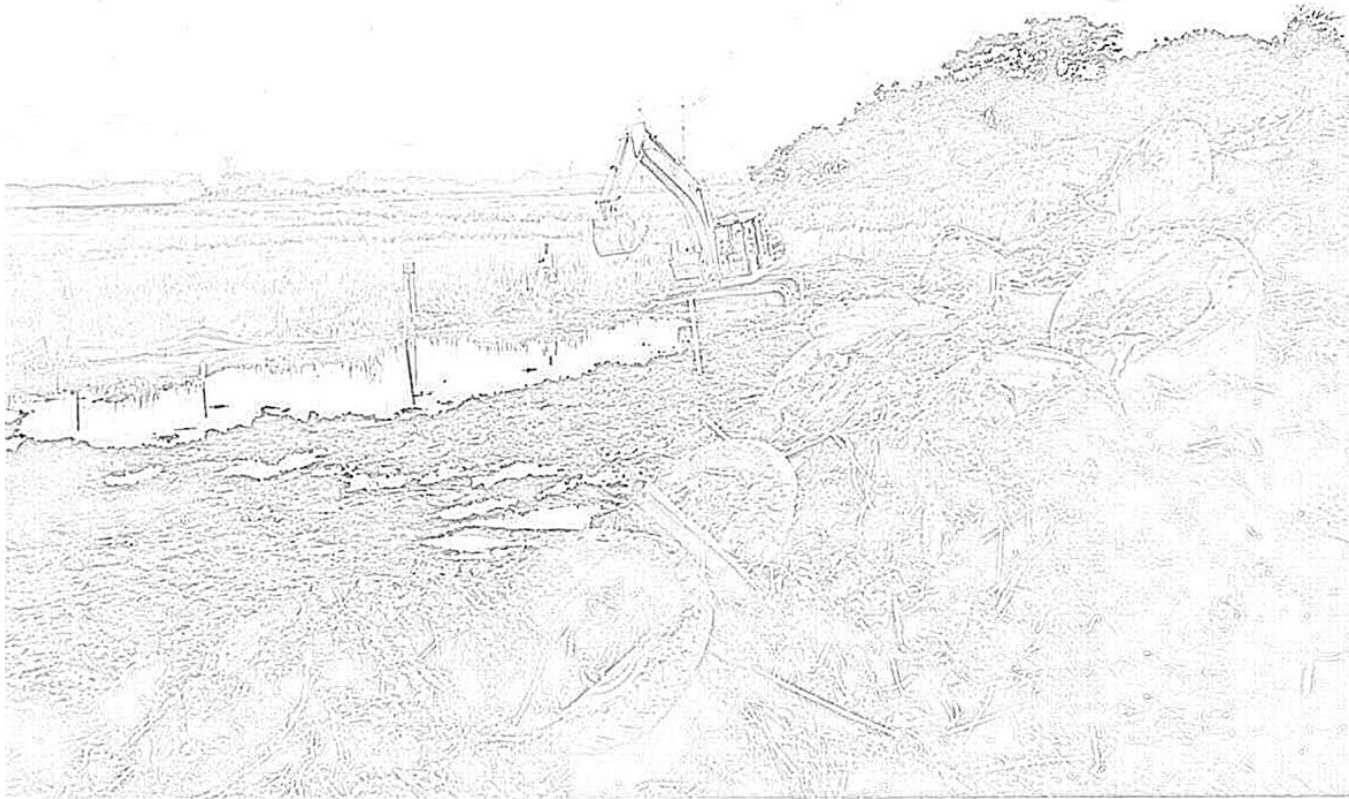


By knowing these things the Sandy Hook scientists can also help fisherman to better understand why fish do what they do and the challenges fish may face. Information from fish tagging also helps scientists work with fishermen to protect enough fish and their environment so that there will be plenty of opportunities to catch fish long into the future.



On some trips, scientists need to look for fish, while on other trips they have the fish come to them! The researcher above is cutting up bits of fish to entice the fish to come closer.

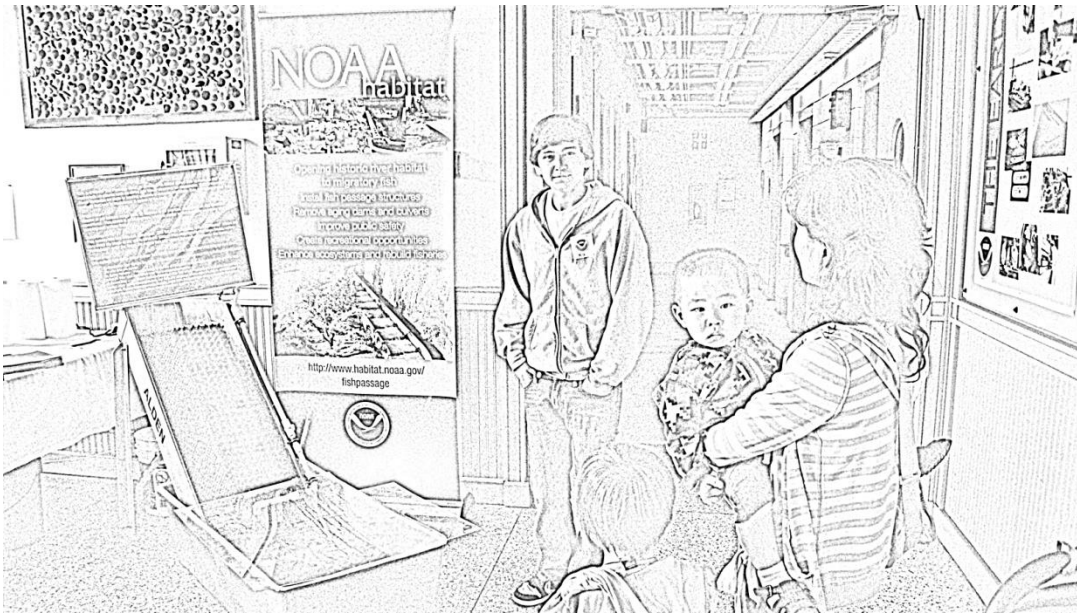




You will also see my friends from the Restoration Center. Created in 1991, it is the only office within NOAA solely devoted to restoring the nation's coastal, marine, and migratory fish habitat.

They focus on four areas of habitat restoration that have the biggest impact to fishery production: opening rivers, reconnecting coastal wetlands, restoring corals, and rebuilding shellfish populations.

They also partner with other agencies and local groups, to help restore other habitats including mangrove forests, seagrass beds, kelp forests, and riparian habitats.

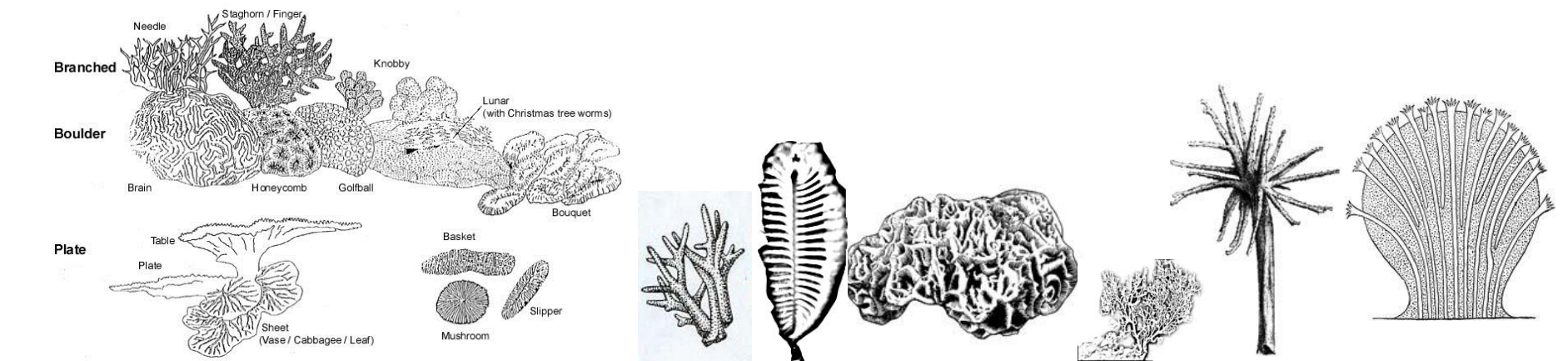


The NOAA Restoration Center field office provides technical project design assistance, grant guidance, and program management for restoration projects. Sandy Hook Restoration staff work to protect and restore aquatic organisms and their habitat. The installation of eel ladders, like this one, help eels move safely within the water ways.

Did you know that there are deep sea corals right off the coast of NJ? My friends at the Lab are also studying corals, which are tiny animals called polyps with skeletons made out of limestone.

Corals live on the bottom of the ocean floor and come in all different shapes and sizes. They are important members of the ocean community.

Laboratory scientists are creating special maps using a Geographic Information Systems (GIS) and predictive modeling to help determine where these corals live.





In the Library, you'll meet librarians Claire and Angela. They care for and maintain a 37,000 volume library, the largest library devoted to fisheries science on the East Coast. The library also subscribes to marine science journals, many in electronic format now. The librarians help our researchers find the information they need to do their work. The library helps to make the work of our researchers available to scientists all over the world.

"Hey Eric look...doesn't the man in that painting look just like Grandpa?"

